

A BEGINNER'S GUIDE FOR PEDAL BUILDING

By trom72 - GuitarPCB.com

In this guide I will demonstrate my routine to give beginners some basic ideas.

Much of my inspiration has come from reading the many guides available at the GuitarPCB.com website. I have compiled the information into a condensed illustrated guide for beginners.

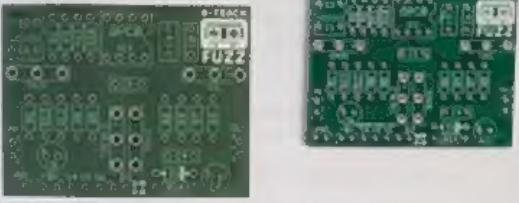
I would like to thank Barry, Wilkie1, Tonmann, Petevig, Billy, Playsforfun and everyone else at [GuitarPCB](http://GuitarPCB.com).

For the purpose of this illustrated guide I chose the 4 Track Fuzz project.

Part 1: Preparation

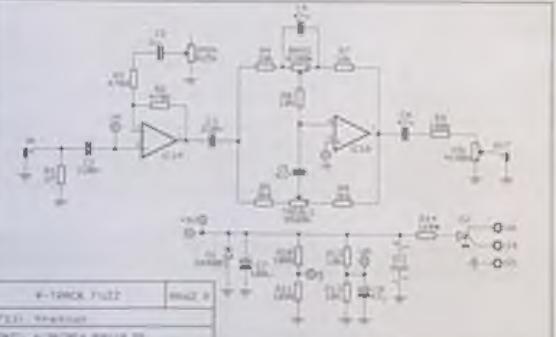
4 Track Fuzz

Board Dimensions (W x H) 1.95" x 2.48"
Board and Schematic designed by Bruce R.
Additional help & circuit testing by Wilkie1.



It hit me really bad when I started longing for that fantastic sound produced when us "Old Timers" used to plug their guitars into old tape recorders (you DO know what these were?) and get this huge SMOOTH distortion that really rocked by simply cranking the channel! There was nothing else like it! Well, we found a cure for my nostalgia.

It's the new version of an old tone. We call it the "4 Track Fuzz". This fantastic circuit recreates that same tone in a modern pedal that everyone can enjoy!

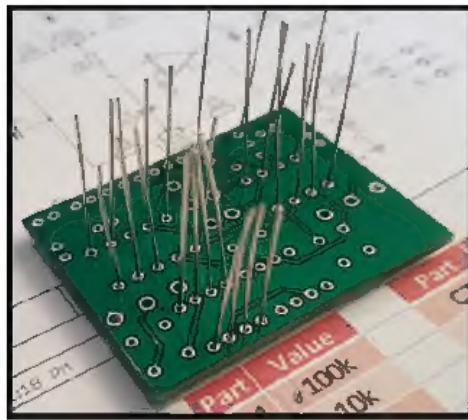


Part	Value	Part	Value	Part	Value	Part	Value
R1	1M	R11	100k	C7	100u		
R2	470k	R12	10k	C8	47u		
R3	470k	R13	10k	D1	1N4001		
R4	10k	R14	1k8 ² 5u	D2	BiColor CA LED		
R5	3k6	C1	220n	IC1	TL072**		
R6	10k	C2	1u				
R7	10k	C3	220n	BASS	8100k		
R8	3k6	C4	47u	GAIN	825k		
R9	100k	C5	47u	TREBLE	8500k		
R10	100k	C6	47u	VOL	A100k		



Part 2: After preparing my work area with everything I will need I think about the order in which I populate the board. It is best to start with components that are the lowest in height and work up. Populate all at once or individually.

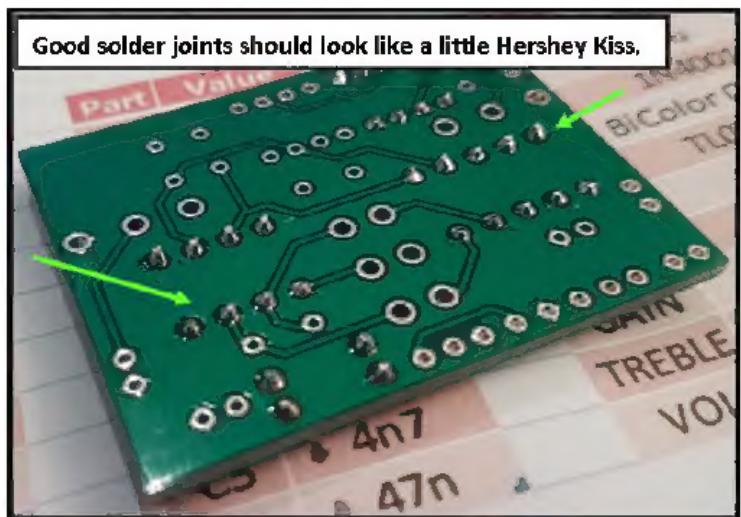
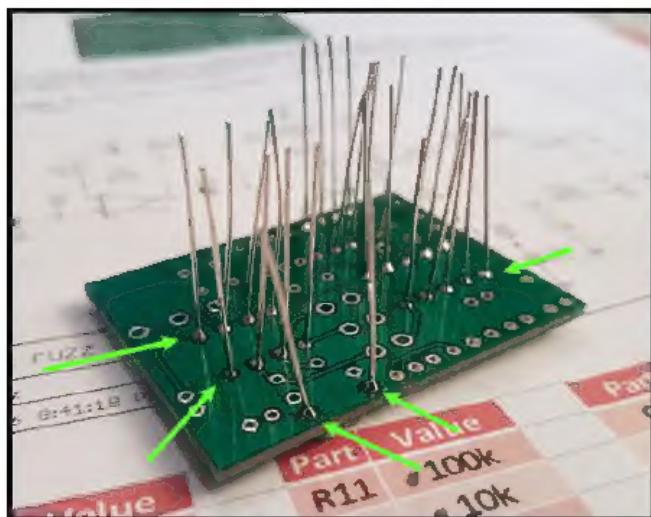
This provides stability when you populate the next components in their height order. Here I will start with resistors.



The right tools for the right job! Get it right the 1st time.

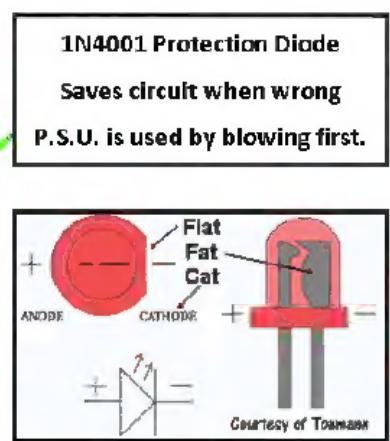
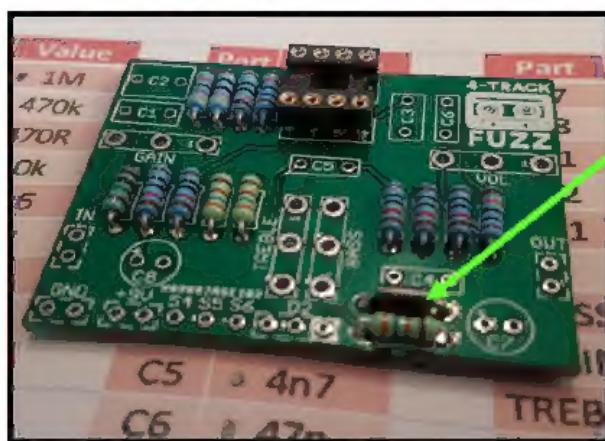
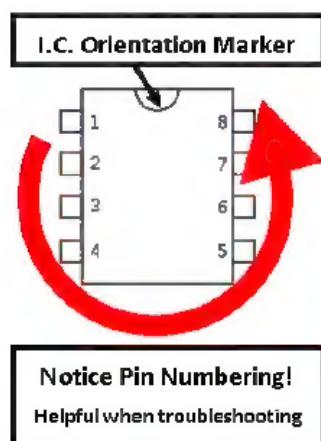
1. A DMM (Digital Multimeter) is indispensable, I suggest a DMM that has a $10\text{M}\Omega$ input impedance (if you can't find specs, don't buy it). It will give accurate voltage readings compared to $1\text{M}\Omega$ DMMs. A continuity tester is also a very useful feature to have (one that beeps when you touch the probes together).
2. Soldering Iron with a temperature control that can use "a fine conical tip". This is similar in look to a sharp pencil. Keep it clean between every 5-8 solder joints and tin the end of the tip often.

In the photo above I chose to populate all at once because it is faster for me. That is up to you. The most important thing is to make sure you verify every resistor using your DMM (Digital Multi Meter) or by color band and then checking them off as you go. By taking the extra time it will save you a lot of headaches down the road. After each leg is soldered, trim the leads.



Part 3: After finishing the resistors and the 1N4001 circuit protection diode and have carefully checked each one off my list I proceed to the sockets. I **always use sockets for IC's and transistors**. They're heat sensitive and sockets allow for a quick change if you have a bad IC or transistor. In some cases you may want to socket resistor, capacitor & clipping diode locations for modding. You will commonly see **Silicon, Germanium and LED** arrangements. Read pages 10 to 14 of Crash Course #2.

The 1N4001 Diode here is for polarity protection only. Stripe side is Cathode and the other is Anode. **Orientation Is Important.**



For the 4 Track Fuzz above I only needed one IC socket. Now to move on to the next steps in order of height.

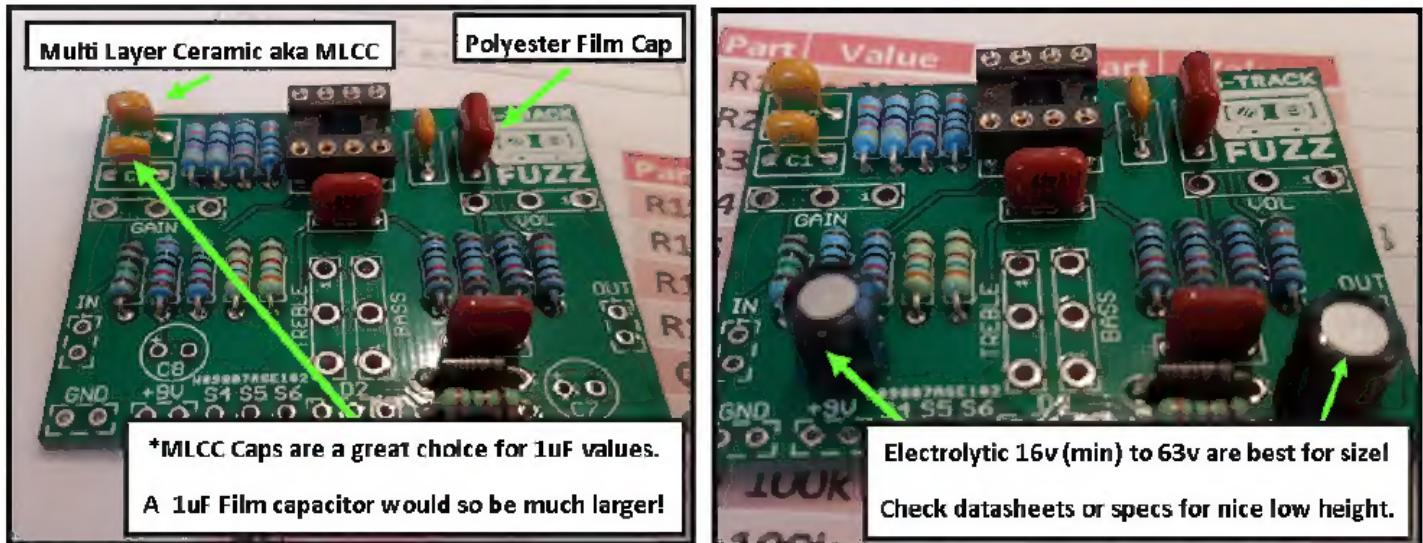
Orientation is always important for Electrolytic capacitors, 1N4001 Diodes, IC Chips, Transistors & LEDs (Google Datasheets!)

Part 4: It is time for the **capacitors**. I start with the smaller **Ceramic** type (if any) then proceed to slightly taller **Film** capacitors.

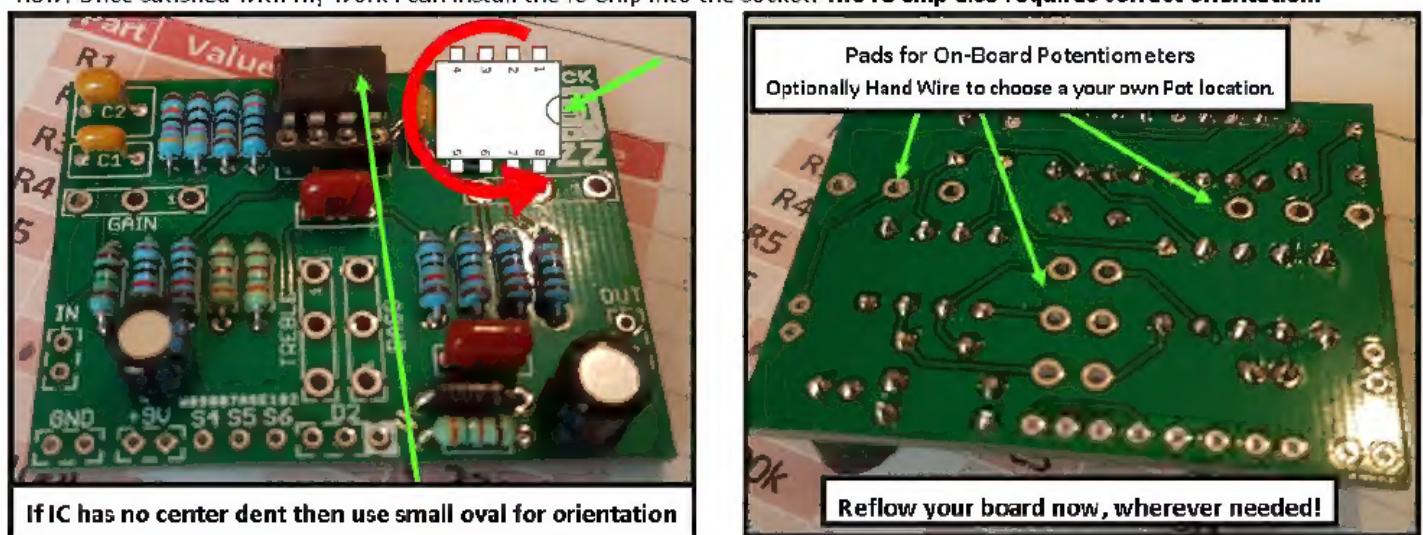
In Photo #1 below I have installed all the Ceramic and Film capacitors. In Photo #2 I proceed to the taller Electrolytic type.

Note: Electrolytic capacitors & Diodes have polarity. **Orientation is important!** GuitarPCB Board silk-screens to the rescue.

Here are some helpful links about components: [Capacitor Code Chart](#) and [Crash Course #2](#)



Part 5: I check over the entire board for good clean solder joints. If there are any questionable areas I can easily re-flow them now. Once satisfied with my work I can install the IC Chip into the socket. **The IC Chip also requires correct orientation.**



Part 6: The Enclosure.

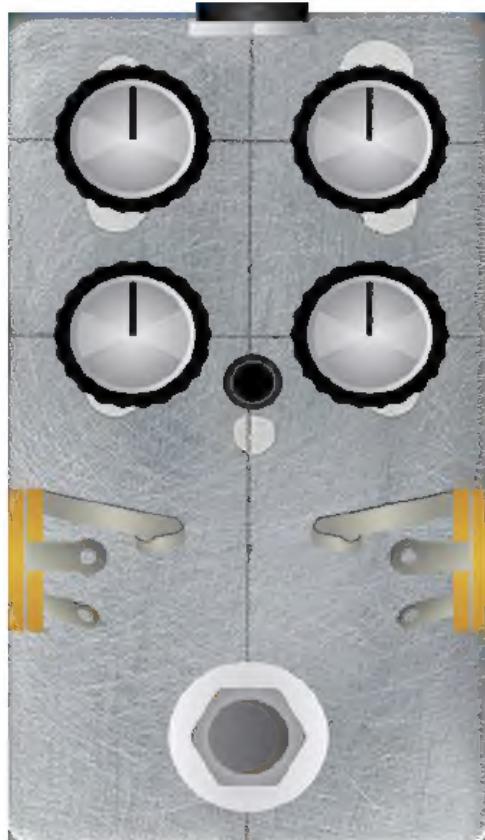
I experiment and use whatever tools I have to make sure I drill the holes correctly. The **4 Track Fuzz Build Document** has a guide or template I can print out since it uses on-board potentiometers. I just need to make sure the printed board is the same



Part 7: Laying out the design. There are many ways to do things so you must decide what works best for you. In this case I placed the drilled enclosure in my scanner to import a picture into Illustrator or whatever program you like (GIMP is Free). I can begin to place knobs, LEDs, 3PDT switch, Input and Output Jacks as well as the power jack. This will give me a better idea about how I would like my pedal to look and make any changes "virtually" that may be needed.

*An Irwin step drill is a good tool for drilling. I suggest the 3 pack. **Be very careful drilling and you must do so at your own risk.**

Here are Helpful links from the [Tips, Tricks and Tutorials](#) section of the forum. [Drill Guides](#), [Pedal Vector Art & Drilling Video](#).



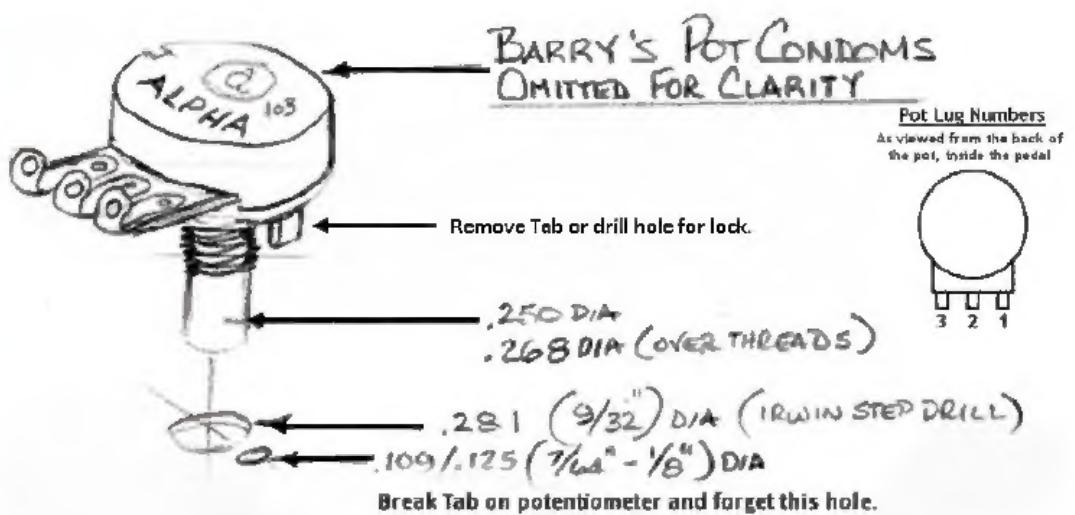
Part 8: Preparing a decal. There are many methods of making nice enclosure artwork. This is the method I chose for the 4 Track Fuzz. I start by preparing the decal in Illustrator or any software that works best for you. **GIMP & Inkscape are Free**



Part 9: Now it is time to work on the enclosure. First decide on Painting, Vinyl Decal, Waterslide Decal, Markers, Label Machine or just a bare enclosure and give it plenty of time to cure or dry. See my Waterslide Result below.

Note the potentiometers. (Potis) When looking at them from the back the lugs from left to right are 3, 2 & 1.

When finishing a pedal I prefer to use **GuitarPCB Pot Condoms** for a “soft” Anti-Static cushion to mount the board to.



Part 10: The Wiring. Look at the pictures below. It is best to pre-wire your potentiometers and your foot switch. **GuitarPCB** also carries an excellent **3PDT Wiring Board** for a great price and keeps your wiring clean as well as allowing you to install either a Standard On/Off LED or one of their three different Bi-Color LEDs while keeping your power wiring and audio wiring separate.

The Hookup Wire can be the hardest or the easiest part depending on quality. **GuitarPCB** carries **Barry's Best Hookup Wire** which is a **24 Gauge** Stranded, Tinned & Bonded wire made in the USA. A quality wire that is flexible, shapeable but strong enough to never break is what you want. I suggest you use multiple colors of wire to keep your builds organized and easy to troubleshoot. Black for ground, Red for Power, White for Audio etc. See pictures below for my preparation steps, left to right.

It does not matter if you use a little extra wire when getting your potentiometers and foot switch ready because you will trim them to be a perfect fit when it comes time to install the board. This is a great way to avoid a rat nest and a noisy pedal.

Always keep power wires routed separate from your Audio wires. Do not run them parallel like this: || This is another reason **GuitarPCB's** wiring method which is also used in their **3PDT Wiring Boards** are best because the wiring is kept separated from the audio and not running in a ribbon style which can cause noise in higher gain pedals. **Keep wire short, do not braid them!**

GuitarPCB boards allow you to mount pots where you want them. 4 Track Fuzz has on-board pots but I prefer my own options!



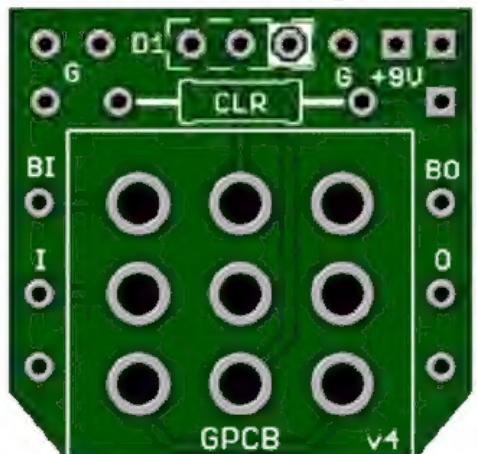
Part 11: Wiring Continued. I prefer to test my circuit board first before wiring it into my enclosure. This makes it easier to troubleshoot if there is a problem. There are many ways to build a simple Testing Station. Post on the forum if interested.

Once satisfied I start trimming the wire to shortest length and then wiring it all in. I save the LED for last. I use Pot Condoms for a cushioned Anti-Static barrier between the board and the pots. The wire also holds the boards in place as well. If I decided to use a 3PDT Wiring Board I now also have the option to mount the LED above the Foot switch instead. If I do this then I ignore S4, S5 & S6 on the GuitarPCB Main board. If I choose to wire an LED to the Main board but do not want to use a Bi-Color LED then I simply ignore S6 and use the ON/OFF status LED with Anode leg at center and Cathode leg to the **Non-White block**.

Remember the **Fat, Flat Cat** from Page 2? I love options! While all GuitarPCB boards are unique, their options are the same!



The Best 3PDT Wiring Board



Lowest Profile - The most options!
(3) 9v Pads, (6) Grounds, CLR & much more!

Use Standard On/Off or Bi-Color LEDs

Now that you have finished your pedal please share your story with us:

A fantastic place to see what others are doing and get even more inspiration.

Study the following guides. Enjoy our friendly forum and team of expert Moderators.

GuitarPCB.com has a dedicated Forum with 9+ years of information and Full Online Support!

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